UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

138 EAST LCD ADVANCEMENTS LIMITED,
Patent Owner.

Case No. IPR2024-00956
U.S. Patent No. 8,355,574

PATENT OWNER'S PRELIMINARY RESPONSE

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2001	Declaration of Nikolaos Papanikolopoulos, Ph.D.

I. PRELIMINARY STATEMENT

Pursuant to 37 C.F.R. § 42.107, Patent Owner 138 East LCD Advancements Limited ("138 East" or "Patent Owner") submits its Preliminary Response to the Petition for *Inter Partes* Review of U.S. Patent No. 8,355,574 ("the '574 patent"). Paper 1 ("Petition" or "Pet."). Petitioner Google LLC challenges the validity of claims 1-12 of the '574 patent.

The Petition does not establish a reasonable likelihood that the asserted references render any of claims 1-12 unpatentable. The asserted references, alone or in combination as presented in the Grounds, do not disclose all limitations of any challenged claim. In particular, the Petition identifies no reference or combination of references that discloses acquiring the properties (such as color or statistical values) of determined main object image data and then acquiring correction conditions corresponding to those properties to use in adjusting the main object image data. The Board therefore should deny institution for failure to present a likelihood that the Petitioner will prevail on any Ground.

II. THE '574 PATENT

The '574 patent describes and claims inventions that improve digital image quality adjustment processes to automatically detect and perform adjustments to "main objects" in an image, specifically "main objects" that include a human face, to more accurately display the main object's appearance. The '574 patent describes

a "main object" as a portion of the image "characterizing the image." Ex. 1001, 1:16-18. The patent identifies several examples of main objects, including "sky," "people (faces)," and "vegetation." *Id.*, 10:56-62, 18:63-67.

The '574 patent inventions address two problems in prior image processing systems "for automatically adjusting picture quality using standard values without the need for user input." *Id.*, 1:23-26. First, prior systems did not accurately identify "the main object characterizing the image." *Id.*, 1:28-37. "[T]he erroneous determination of the main object can thus result in poor picture quality." *Id.* Therefore, "there is a need for a technique to accurately determine the main object." *Id.*

Second, prior systems made "main object" determinations "across the board, without taking into consideration subtle differences in the main object characterizing the image." *Id.*, 1:38-48. Further, in those prior systems, "a standardized picture quality adjusting process is carried out on the main object that has been determined." *Id.* Using a standardized process for all main objects makes it "inherently impossible to carry out a picture quality adjusting process that takes advantage of the subtle characteristics of the main object, and it is [therefore] not always possible to output a more attractive main object." *Id.* Therefore, "[t]here is [] a need for a picture quality adjusting technique that is more responsive to variations in main objects." *Id.*

The ’574 patent describes a “First Embodiment” that provides an improved technique for accurately determining a main object and a “Second Embodiment” that provides an improved picture quality adjusting technique that is more responsive to variations in main objects.

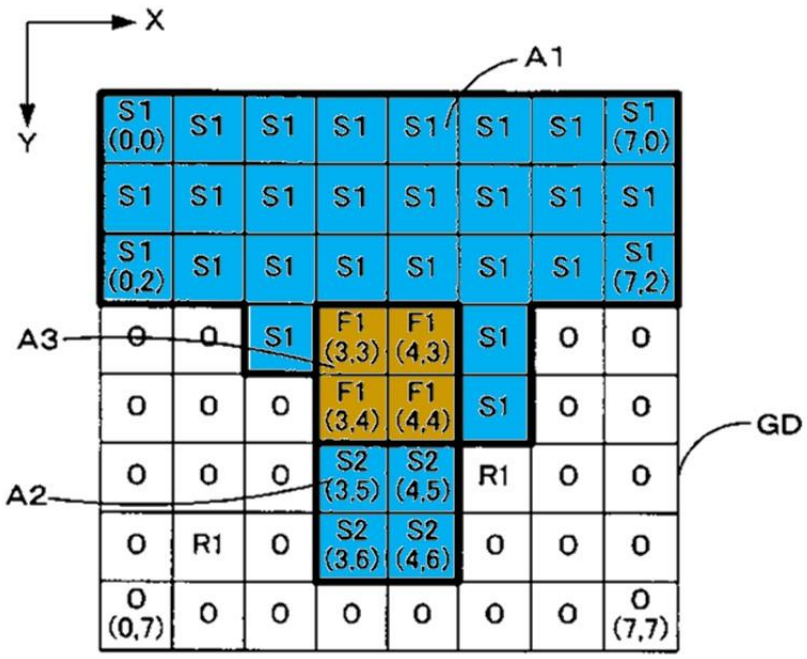
A. “First Embodiment”: Improved Main Object Determination.

The ’574 patent describes a “First Embodiment” that teaches an improved process to more accurately determine main objects in images that include human faces by comparing the color and position of portions of the image data to color and position conditions to determine the main object by determining whether the image includes a human face. Notably, this main object determination process relies on information contained in the image data; the determination does not require information related to the conditions under or by which the image was acquired, such as camera settings or photography information that is attached to the image data. *See* Ex. 2001, ¶¶48-51.

For example, the main object detection process first uses the hue of color range areas to narrow the main object candidates to either “sky, green, or persons.” Ex. 1001, 10:56-58. As shown in Figure 6 below, “sky” is a main object candidate for the color ranges A1 and A2 (highlighted in **blue**) because they exhibit sky blue color, and “person (face)” is a main object candidate for color region A3 (highlighted in **tan**) because it exhibits a “flesh tone.” *Id.*, 10:56-62. Next, the

position data of the color range areas are compared to position data that stipulate valid position conditions (e.g., ranges) where objects exhibiting a specific color range may be present. *Id.*, 10:63-11:18. For example, two color range areas A1 and A2 (as shown in Figure 6 where area A1 is the sky and area A2 is a shirt) that both exhibit "sky blue" color ranges may be distinguished by comparing the position data of the color range area with position conditions that stipulate the area of the exemplary main object "sky." *Id.*, 10:63-11:7.

Fig.6

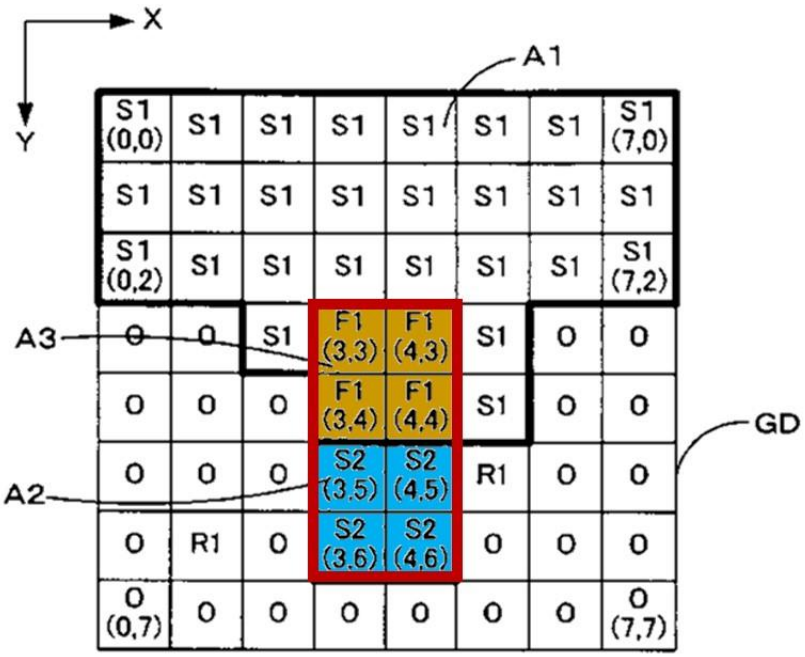


Id., Fig. 6.[1]

[1] All colors are added annotations unless otherwise noted.

The main object is detected by comparing the color range and position conditions to possible main object candidates in the image data. *Id.*, 10:63-11:18. For example, "sky" is determined as a main object for region A1 because the color range of region A1 exhibits a hue of "sky blue" and the color range area meets the position conditions defining the object "sky" (an area in x-y position coordinates (x,0): $0<x\leq7$ and (0,y): $0\leq y\leq2$). *Id.* However, region A2, which also exhibits sky blue color, is determined not to be "sky" because, although region A2 exhibits the same color range as object "sky," region A2 does not meet the position conditions for the object "sky." *Id.* Instead, "the color range area A2 corresponds to sky blue clothing." *Id.*, 11:8-15. And "person (face)" is determined as a main object for region A3 because it "includes an area, such as area (3,4), which meets [the] position conditions" for the object "[p]eople" (an area in x-y position coordinates (x,0): $2<x\leq5$ and (0,y): $2\leq y\leq5$). *Id.*, 10:63-11:7, 11:16-18. Accordingly, the main object determination process uses color and position information to determine that, for example, as shown in Figure 6 below, the main object characterizing the image is a person (outlined in **red**), comprising areas A2 (clothing, highlighted in **blue**) and A3 (face, highlighted in **tan**), by determining that the image includes a human face. *Id.*, 11:19-42; Ex. 2001, ¶50.

Fig.6



Id., Fig. 6.

This main object detection method of determining the main object in images that include a human face by determining whether the image includes the human face improves the accuracy of determinations of the main object because, for example, sky blue clothing will not be erroneously determined to be sky. *Id.*, 11:31-42. Instead, the main object can be correctly identified as a person comprised of a face and a sky-blue shirt. Ex. 2001, ¶51.

B. "Second Embodiment": Improved Adjustment of Data Determined to Represent a Main Object Using the Properties of that Main Object Data to Acquire Correction Conditions Specific to Those Properties.

The '574 patent's "Second Embodiment" improves image quality adjustments to main objects that the image processing system has identified by analyzing the properties (such as color and statistical values) of the image data for those objects and selecting corrections corresponding to those properties. By adjusting the main object image data using "conditions corresponding to the properties" of the determined main object data, "[i]t is thus possible to improve the picture quality of the main object characterizing the image." *Id.,* 3:62-4:2; *see* Ex. 2001, ¶¶52-62.

This aspect of the invention improves upon inferior prior art systems that carried out "a standardized picture quality adjusting process . . . on the main object that has been determined," and thus did not "carry out a picture quality adjusting process that takes advantage of the subtle characteristics of the main object." *Id.,* 1:38-48.

Claim 1 recites an image processing method that performs the improved process described in the "Second Embodiment," with steps for "determining a main object in an image," "acquiring the properties of the determined main object

image data" and "acquiring correction conditions corresponding to the properties that have been acquired":

> 1. A method of image processing, the method comprising:
>
> **determining a main object in an image** generated by an image generating apparatus, wherein the main object includes at least a human face, and wherein the determining of the main object is implemented by determining whether the image includes the human face;
>
> acquiring **properties of the determined main object**;
>
> acquiring **correction conditions corresponding to the acquired properties**; and
>
> adjusting image quality of the main object using the acquired correction conditions, wherein a parameter used in adjusting the image quality is a highlight, a shadow, brightness, contrast, color balance, or memory color, and
>
> wherein each operation of the method of image processing is executed by one of a personal computer, a printer, or a display device.

Id., 27:54-28:3 (emphasis added).

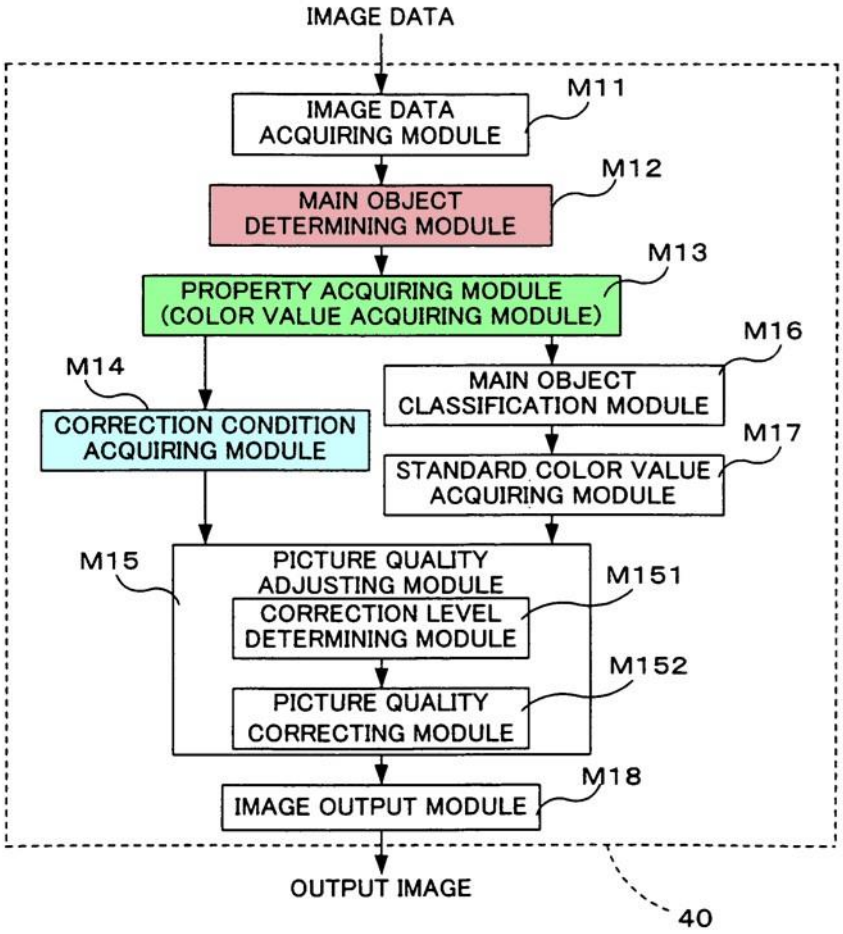
The ’574 patent’s improved main object image data adjustment process includes several inventive steps. First, the system determines a main object including a face in an image, and then the system acquires “properties” of the determined main object image. *Id.*, 14:49-59, Fig. 13. The specification describes “statistical values and color values” as examples of such “properties.” *Id*. It describes “maximum and minimum luminance, and histograms of R, G, and B components in the main object image data” as examples of such “statistical values.” *Id.*, 16:25-31.

After determining the main object and acquiring the properties of the determined main object, the system “acquires correction conditions corresponding to the acquired properties.” *Id.*, 14:49-59. “Correction conditions” include values for image data parameters related to image quality, “and include, for example, shadow, highlight, brightness, contrast, color balance, and memory color correction parameters.” *Id.*, 16:25-31. For example, the system uses brightness properties to determine, “based on the luminance value calculated from the areas of the main object,” whether the image is too dark or too bright, and then uses corresponding “correction levels for brightness” that are obtained from standard brightness values to correct the brightness level of the main object according to whether the image is too dark or too bright. *Id.*, 17:15-20.

In some embodiments, "correction conditions" are "standard color values corresponding to" main objects that are classified "in greater detail." *Id.*, 15:16-20. For example, for a main object identified as "people (face)," the system can acquire correction conditions for the "ideal color values for" different face tones, such as "pale pink flesh, light yellow flesh, dark yellow flesh, and dark brown flesh." *Id.*, 15:18-20 (discussing ideal color values), 18:65-19:1 (discussing application to main objects identified as "people (face)").

Figure 13 illustrates the '574 invention's process of determining a main object (highlighted in **red**), acquiring and analyzing the properties (highlighted in **green**) of the image data that has been determined to represent the main object, and then acquiring correction conditions corresponding to those properties (highlighted in **blue**):

Fig.13



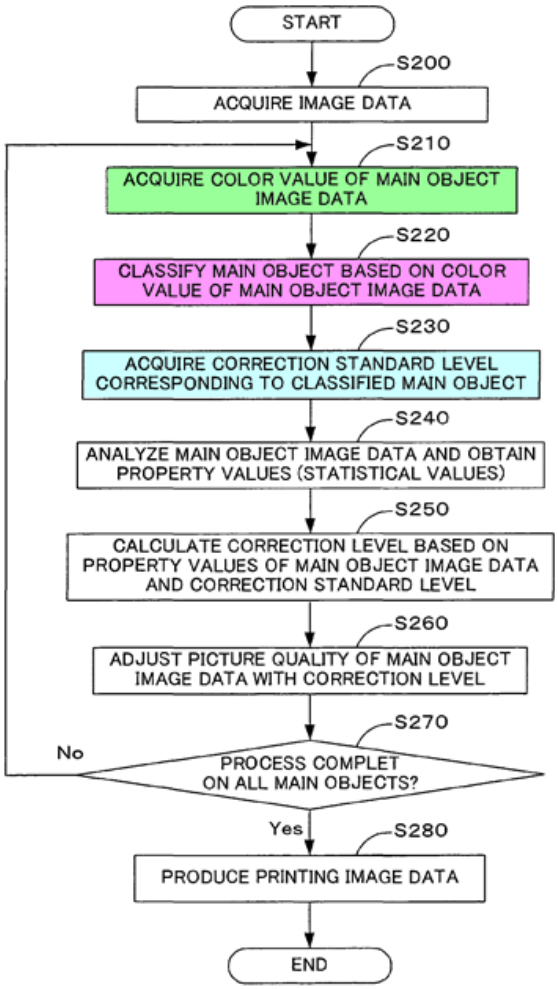
Id., Fig. 13.

The ’574 patent explains that—compared to a “standardized picture quality adjusting process”—determining a main object (M12), then acquiring properties characterizing the main object image (M13), and then acquiring correction conditions corresponding to those properties (M14) enables more granular adjustment of main objects that have the same general type (such as a face) but have different properties (such as skin tone). The ’574 patent explains that using these processes enables a system in which “the same type of main objects are classified into more detailed main objects to implement better picture quality adjustment of the main object image data.” *Id.*, 15:60-67. Using this system, “[t]he identified main object can also be classified in further detail, allowing the optimal picture quality adjusting process to be carried out on the classified main object. That is, the specified main object can be further characterized to improve the accuracy of the picture quality adjusting process on the main object image data.” *Id.*, 17:63-18:9.

Because the invention acquires correction conditions based on previously acquired properties of the main object image data, such as color and statistical values, the invention enables a system that can classify a main object at multiple levels of granularity and acquire correction conditions tailored to that granular classification. *Id.*, Fig. 14, Fig. 15, 17:63-18:9, 18:63-19:1. For example, for a main object identified as “people (face),” acquiring correction conditions

corresponding to the properties of the image data of the main object as opposed to merely using correction conditions based on the identified main object "face" provides "different standards with more attractive, higher picture quality" for different skin tones—such as "pale pink flesh, light yellow flesh, dark yellow flesh, and dark brown flesh"—to "carry[] out the optimal picture quality adjusting process on the specified [main object]." *Id.*, 17:63-18:9, 18:63-19:1. Figure 14 illustrates an example process that includes a classification step (S220, highlighted in **purple**) for the main object, based on its data's acquired properties (here, color values).

Fig.14



Id., Fig. 14. Figure 15 illustrates examples of different types of classified main objects that have been classified based on their data's properties (here, color values), and the different correction conditions (here, "correction standard level") corresponding to those properties:

Fig.15

CLASSIFIED MAIN OBJECT	CLASSIFICATION COLOR VALUE	CORRECTION STANDARD LEVEL
BRIGHT SKY	Hcsb, Scsb, Bcsb	CONTRAST b, BRIGHTNESS b, COLOR BALANCE b
ORDINARY SKY	Hcsn, Scsn, Bcsn	CONTRAST n, BRIGHTNESS n, COLOR BALANCE n
DARK SKY	Hcsd, Scsd, Bcsd	CONTRAST d, BRIGHTNESS d, COLOR BALANCE d

Id., Fig. 15, 16:13-24. These correction conditions, corresponding to main object image data properties, allow for "detailed main objects [to] be output at their most attractive." *Id.*, 16:13-24. The '574 invention's improved process allows correction of main objects by using correction conditions corresponding to the properties of the main object (e.g., step M14 in Figure 13), instead of performing the same coarse operation on a general determined main object, for example, a human face (e.g., step M12 in Figure 13). *Id.*, 17:63-18:9, 18:63-19:1.

* * *

None of the asserted references or combinations disclose or render obvious the claimed systems or processes that deliver the improved main object image quality adjustment benefits of the '574 inventions.

III. CLAIM CONSTRUCTION

For purposes of this Preliminary Response, Patent Owner contends that the claims should be given their ordinary and customary meaning in light of the

specification and prosecution history, as understood by a person of ordinary skill in the art. 37 C.F.R. § 100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005).

IV. LEGAL STANDARD

The Board may not institute an *inter partes* review unless the Petition demonstrates a reasonable likelihood that the petition would prevail with respect to at least one of the claims challenged in the petition. 35 U.S.C. § 314(a).

V. LEVEL OF ORDINARY SKILL IN THE ART

For purposes of this Preliminary Response only, Patent Owner does not dispute the level of skill for a person of ordinary skill in the art ("POSITA"), set forth in the Petition. Pet., 15-16. The level of skill in the art does not affect whether to deny institution, because the Petition and Petitioner's expert do not address certain claim limitations of the '574 patent and disclosures from the asserted prior art references. Patent Owner does not waive, however, any argument regarding the proper level of skill and reserves the right to later advance additional arguments.

VI. THE PETITION DOES NOT ESTABLISH A REASONABLE LIKELIHOOD THAT THE ASSERTED REFERENCES RENDER UNPATENTABLE ANY CHALLENGED CLAIM.

The Petition's primary references upon which Grounds 1-2 and Ground 3 depend, Luo-250 and Yano, respectively, differ fundamentally from the '574 patent's claimed inventions.

Regarding Grounds 1-2, Luo-250 does not identify "main objects" in image data and then acquire correction conditions corresponding to the properties—such as color or statistical values—of the data corresponding to those objects. Instead, Luo-250 calculates probabilities, for each pixel in an image, that the pixel contributes to a broad "target subject matter" category, such as sky, grass, or human flesh. Luo-250 then performs standard image adjustment operations to every pixel in an image, and merely weights those operations on a per-pixel basis based on the probability values for each pixel. Unlike the '574 invention, Luo-250 does not determine a main object in an image and perform adjustments to the main object based on the properties of the main object. Ex. 2001, ¶¶64-67, 69-82.

As a result, Luo-250 does not disclose multiple claim elements corresponding to the "Second Embodiment" of the '574 inventions. Independent claims 1, 3, 5, 7, 9, and 11 recite variations of that embodiment that provide improved image quality adjustment of detected main objects. Because Luo-250 does not adjust image quality using image data properties, much less properties of the determined main object, Luo-250 does not disclose the "acquiring properties of the determined main object" limitation recited (with minor variations) in all of independent claims 1, 3, 5, 7, 9, and 11. Moreover, because Luo-250 does not acquire such properties, Luo-250 also does not disclose "acquiring correction conditions corresponding to the acquired properties [of the determined main

object]" again recited (with minor variations) in all of independent claims 1, 3, 5, 7, 9, and 11.

The Petition does not assert, for any Ground, that Luo-250 or any other reference would render these limitations obvious. The Petition instead erroneously contends that Luo-250's express disclosure satisfies these limitations, but the Petition does not address the aspects of Luo-250 demonstrating that it operates in a fundamentally different way than the '574 claimed inventions. The Petition does not establish a reasonable likelihood that Luo-250 renders any challenged '574 claim obvious, alone or in conjunction with any other reference.

Regarding Ground 3, Yano also does not identify "main objects" in image data and then perform adjustments using correction conditions corresponding to the properties—such as color or statistical values—of the determined main object. Instead, Yano's system only performs image quality adjustments if the camera used to acquire an image was set to person mode, to indicate that the subject of the image is a person, before the image was captured. And Yano's image quality adjustment process uses only one target value for brightness and one target value for color (hue) correction to perform adjustments to each pixel of all face regions Yano's system identifies. Yano's two target values, which are determined in advance of any image processing, therefore are not "correction conditions corresponding to the acquired properties [of the determined main object]" recited

(with minor variations) in all of independent claims 1, 3, 5, 7, 9, and 11. Unlike the '574 invention, Yano does not determine a main object in an image and perform adjustments to the main object using correction conditions corresponding to the properties of the determined main object. Ex. 2001, ¶¶90-95, 97-100.

The Petition does not assert that Yano or any other reference would render this limitation obvious. The Petition instead erroneously contends that Yano's express disclosure satisfies this limitation, but the Petition does not address the aspects of Yano demonstrating that it operates in a fundamentally different way than the '574 claimed inventions. The Petition does not establish a reasonable likelihood that Yano renders any challenged '574 claim obvious, alone or in conjunction with any other reference.

A. The Petition does not establish a reasonable likelihood that Luo-250 and Hibi render obvious claims 1, 3, 5, 7, 9, and 11 (Ground 1).

1. Luo-250: Overview

In contrast to the '574 inventions, Luo-250 describes a system that performs calculations on probability values for individual pixels and performs traditional image operations on all pixels in an image based on those probability values. Ex. 1005, [0031]-[0036], [0038], [0045], [0064]-[0066]. Luo-250's system assigns probability values to every pixel in an image to indicate the likelihoods that the pixel is part of certain subject matter, such as grass, fabric, or skin. *Id.*, [0038]-

[0040]. Luo-250 calls these pixel-by-pixel probabilities "belief maps." *Id.*, [0017], [0032], [0033], [0043], [0044], [0064].

Among other differences from the '574 inventions, Luo-250 does not correct potential main objects by acquiring properties (such as color or statistical values) of the determined main object and then acquiring correction conditions corresponding to those properties. Luo-250 does not perform image enhancement operations based on properties of the main object image data. Instead, Luo-250 describes determining probabilities that individual pixels belong to subject matter categories and performing traditional image enhancement operations by operating on the individual pixels' probability values. *Id.*, [0032], [0043], [0064].

Luo-250's purported solution thus differs materially from the '574 inventions. Ex. 2001, ¶¶64-67. In particular, Luo-250, unlike the '574 inventions, does not determine a "main object," then acquire properties of the data corresponding to that determined object, and then acquire correction corrections corresponding to the acquired properties, such that the correction conditions corresponding to the acquired properties allow the system to adjust main objects that have the same general type (such as a face) but have different properties (such as skin tone) in a more granular way. Instead, Luo-250 determines probability values for every pixel in an image for one or more different "subject matters," which generates, for each pixel, a set of probabilities that the pixel *might* contribute

to several different types of subject matter. Luo-250 then provides an "image enhancement operation" based on the probable subject matters of the individual pixels and does not acquire correction conditions corresponding to the properties of the main object image data, which is the same technique as in prior systems: a "standardized picture quality adjusting process" based on general subject matter and not based on the properties of the image data of the determined main object. In fact, Luo-250 does not even use image properties during the "image enhancement operation" but rather the probability values assigned during the general subject matter belief determining operation. *Id.*, [0032], [0043], [0064].

2. The Petition fails to show that Luo-250 and Hibi disclose or render obvious all limitations of any challenged claim.

a. Claim 1

i. The Petition does not show that Luo-250 discloses or renders obvious "acquiring properties of the determined main object" (claim 1[b]).

Luo-250 does not disclose "acquiring properties of the determined main object." Luo-250 does not teach or suggest acquiring "properties" of a portion of an image that Luo-250's system has determined to correspond to a main object.

The Petition asserts that Luo-250 discloses "acquiring various properties of the determined main object, depending on the image processing, including color, brightness, contrast, and tone scale" because it discloses "automatically

determin[ing] the amount of image enhancement for each region in an image **based on the subject matter content of the region**." Pet., 26 (emphasis added).

The plain language of the claim requires that the correction conditions correspond to the properties of the image data of the determined main object and not merely the type of main object (e.g., "the subject matter content") as was done in prior systems and described in Luo-250.The Petition does not provide any evidence that Luo-250 performs the claimed limitations of determining a main object and then acquiring properties of the main object image data (such as color and statistical values). The Petition does not address the plain claim language that the "properties" are "properties *of the* determined main object" and not merely properties of individual pixels within the main object. Instead, the Petition points to portions of Luo-250 that disclose determining the amount of image enhancement *based on the object type* (e.g., the subject matter content). Pet., 26. The Petition makes no attempt to show that Luo-250 teaches or suggests acquiring properties of any image data other than the individual pixel data acquired in constructing the belief map, much less acquiring properties of the main object image data. *Id.* Moreover, the Petition does not show that those properties of the main object are used to select Luo-250's "image enhancement operation" or relate at all to how Luo-250 determines the amount of image enhancement to apply a particular region.

First, Luo-250 explains that its system obtains "color and texture features" for "each pixel" in an image only once—at the very outset of its process, before it attempts to predict which pixels might correspond to a particular "target subject matter." Ex. 1005, Fig. 1, Fig. 9, Fig. 10, [0043] ("First, an input color digital image is obtained 1011. Next, each pixel is assigned 1021 a subject matter belief value . . . based on color and texture features . . . ."). Then, a "subject matter detector" is selected and applied to the digital image to produce a "subject matter belief map," which assigns to each pixel a probability ("belief value") that it might belong to a "target subject matter." *Id.*, [0032], [0044]; *see, e.g.*, [0036] ("For each pixel in the input color digital image, the probability that it is a skin-tone pixel is computed."). Luo-250 does not "acquir[e] properties of the determined main object image data," as claimed.

Second, after Luo-250's belief maps are generated, an "image enhancement operation" is selected. *Id.*, [0045]. But Luo-250 does not disclose or suggest, as the Petition asserts, Pet., 26, that the "image enhancement operation" is selected on the basis of properties of the region to be enhanced—rather, Luo-250 discloses only that pre-determined image enhancements are based solely on the belief map of the individual pixel and the probability that that individual pixel is part of a certain subject matter. Ex. 1005, [0045].

Third, once an image enhancement operation is selected, Luo-250 explains that the amount of image enhancement that is actually applied to a particular "target subject matter" is controlled by an "enhancement control signal" which is in turn "dependent upon" the "values of one or more belief maps." *Id.*, [0045], [0073]. The image enhancement "according to the control signal" is then applied "to the input digital image 10 to produce an enhanced image." *Id.*, [0045]. In short, Luo-250's image operations determine the amount of image enhancement (to any image property) to actually apply to each individual pixel in an input image using belief maps, which are probability distributions that a particular pixel belongs to a target subject, not properties of the target subject. *Id.* [0045], [0064] ("The value of the control signal $\beta(x,y)$ at any particular location (x,y) is related to the value of various belief maps $\underline{M}(x,y)$ at the corresponding image locations.").

The Petition therefore has not established a reasonable likelihood that Luo-250 discloses or suggests a "acquiring the properties of the determined main object image," as claimed. Ex. 2001, ¶¶69-75. The Petition does not contend that Luo-250 renders this limitation obvious. Pet., 26-27.

ii. The Petition does not show that Luo-250 discloses or renders obvious "acquiring correction conditions corresponding to the acquired properties [of the determined main object]" (claim 1[c]).

Luo-250 does not disclose "acquiring correction conditions corresponding to the acquired properties." First, because Luo-250 does not disclose "acquiring properties of the determined main," Luo-250 also does not disclose "acquiring correction conditions corresponding to" those properties. Second—and a fundamental difference from the '574 invention's solution to deficient correction of "main objects"—Luo-250 does not describe using color, brightness, contrast, or tone scale properties to acquire "correction conditions corresponding to" those properties. Rather, Luo-250 uses predetermined standard image operations based solely on a standardized category of "target subject matter," such as "sky."

The Petition relies on Luo-250's description of adjusting color mapping, brightness and color balance, and contrast and tone scale of face regions to satisfy the claimed "correction conditions." Pet., 27-29. But as discussed above, Luo-250 does not link selection of any of those adjustments to any properties of any set of data, let alone the properties of the determined main object. *See* §VI.A.2.i, *supra*. In fact, Luo-250 explicitly states that these operations are based, at most, on a predetermined function for coarse categories of target subject matter, and not based on the properties of any determined main object image data. *Id.*, [0049]. The

Petition therefore fails to show what the claim requires—a "corresponden[ce]" between "properties" and the alleged "correction conditions." Ex. 1001, 27:61-62.

Luo-250 does not describe how to select an "image enhancement operation" because, unlike the '574 patent, Luo-250 does not purport to introduce any new enhancement operation based on the properties of a determined main object. Instead, Luo-250 performs only standard image enhancement operations on the type of identified "target subject matter," weighted by probability values. *See* §VI.A.1, *supra*. Notably different than the '574 invention, Luo-250 does not contemplate correction conditions corresponding to the properties of the determined main object, which allows differentiating among "target subject matter" of the same type—like faces of different colors—based on their unique characteristics. Rather, Luo-250 merely accumulates probabilities that individual pixels correspond to broad "target subject matter" categories such as "human flesh, sky, lawn grass, snow field, [and] water body." *Id.*, [0079].

Luo-250 thus suffers from the problem identified in the background of the '574 patent: it performs adjustments using "a standardized picture quality adjusting process." Ex. 1001, 1:38-46. Because Luo-250 does not associate "correction conditions" with main object "properties," "[i]t is therefore inherently impossible to carry out a picture quality adjusting process that takes advantage of the subtle

characteristics of the main object, and it is not always possible to output a more attractive main object." *Id.*

The Petition, consistent with Luo-250's lack of disclosure linking any image properties to selecting an "image enhancement operation," does not explain how Luo-250 teaches that any memory color, brightness, color balance, contrast, or tone scale "correction conditions" "*correspond[] to*" acquired values of those properties—or *any* properties—of the image. Pet., 27-29. Luo-250 does not disclose how or where the color, brightness, contrast, or tone scale enhancements to which the Petitioner cites, *id.*, are acquired. Ex. 1005, [0049]-[0051]. The Petition offers no basis in Luo-250 for its assertions that a POSITA would have understood that Luo-250's enhancements operations that mention these properties teaches acquiring correction conditions corresponding to these properties. Moreover, as discussed above, Petitioner offers no basis that these mentioned properties are acquired properties of the determined main object as required by the claim. Pet., 27-29.

Because the Petition has provided no evidence that Luo-250 discloses or suggests "acquiring correction conditions *corresponding to* [any image] properties" it has not established a reasonable likelihood that Luo-250 discloses or suggests "acquiring correction conditions corresponding to the acquired properties

[of the determined main object].” Ex. 2001, ¶¶76-81. The Petition does not contend that Luo-250 renders this limitation obvious. Pet., 27-29.

iii. The Petition does not show that Luo-250 discloses or renders obvious “adjusting image quality of the main object using the acquired correction conditions” (claim 1[d]).

Luo-250 performs the inferior “standardized picture quality adjusting process” described in the Background of the ’574 patent. *See* §VI.A.1, *supra*; Ex. 1001, 1:38-46. Luo-250 does not “adjust[] image quality of the main object using the acquired correction conditions [corresponding to the properties of the determined main object image data],” as claimed. The Petition therefore does not establish a reasonable likelihood that Luo-250 discloses claim element 1[d], for the reasons discussed above for claim elements 1[b] and 1[c]. Ex. 2001, ¶82.The Petition does not contend that Luo-250 renders the missing aspects of this limitation obvious. Pet., 29-30.

b. Claim 3

The Petition fails to show that Luo-250 discloses or renders obvious “acquiring properties of the determined main object” as claimed in 1[b], “acquiring correction conditions corresponding to the acquired properties” as claimed in 1[c], and “adjusting image quality of the main object using the acquired correction conditions” as claimed in 1[d]. *See* §VI.A.2.a.i-iii, *supra*. Accordingly, the Petition

fails to show that Luo-250 discloses or renders obvious "adjusting image quality of the main object using correction conditions corresponding to properties of the determined main object" as claimed in 3[b], and thus fails to show that Luo-250 and Hibi disclose or render obvious all elements of claim 3.

c. Claim 5

The Petition fails to show that Luo-250 discloses or renders obvious "acquiring properties of the determined main object" as claimed in 1[b], "acquiring correction conditions corresponding to the acquired properties" as claimed in 1[c], and "adjusting image quality of the main object using the acquired correction conditions" as claimed in 1[d]. *See* §VI.A.2.a.i-iii, *supra*. Accordingly, the Petition fails to show that Luo-250 discloses or renders obvious "a property acquirer configured to acquire properties of the determined main object" as claimed in 5[d], "a correction condition acquirer configured to acquire correction conditions corresponding to the acquired properties" as claimed in 5[e], and "an image quality adjuster configured to adjust image quality of the main object using the acquired correction conditions" as claimed in 5[f]. The Petition therefore fails to show that Luo-250 and Hibi disclose or render obvious all elements of claim 5.

d. Claim 7

The Petition fails to show that Luo-250 discloses or renders obvious "acquiring properties of the determined main object" as claimed in 1[b], "acquiring

correction conditions corresponding to the acquired properties" as claimed in 1[c], and "adjusting image quality of the main object using the acquired correction conditions" as claimed in 1[d]. *See* §VI.A.2.a.i-iii, *supra*. Accordingly, the Petition fails to show that Luo-250 discloses or renders obvious "an image quality adjuster configured to adjust image quality of the main object using correction conditions corresponding to properties of the determined main object" as claimed in 7[d], and thus fails to show that Luo-250 and Hibi disclose or render obvious all elements of claim 7.

e. Claim 9

The Petition fails to show that Luo-250 discloses or renders obvious "acquiring properties of the determined main object" as claimed in 1[b], "acquiring correction conditions corresponding to the acquired properties" as claimed in 1[c], and "adjusting image quality of the main object using the acquired correction conditions" as claimed in 1[d]. *See* §VI.A.2.a.i-iii, *supra*. Accordingly, the Petition fails to show that Luo-250 discloses or renders obvious "computer readable code for acquiring properties of the determined main object" as claimed in 9[c], "computer readable code for acquiring correction conditions corresponding to the acquired properties" as claimed in 9[d], and "computer readable code for adjusting image quality of the main object using the acquired correction conditions" as

claimed in 9[e]. The Petition therefore fails to show that Luo-250 and Hibi disclose or render obvious all elements of claim 9.

f. Claim 11

The Petition fails to show that Luo-250 discloses or renders obvious "acquiring properties of the determined main object" as claimed in 1[b], "acquiring correction conditions corresponding to the acquired properties" as claimed in 1[c], and "adjusting image quality of the main object using the acquired correction conditions" as claimed in 1[d]. *See* §VI.A.2.a.i-iii, *supra*. Accordingly, the Petition fails to show that Luo-250 discloses or renders obvious "computer readable code for adjusting image quality of the main object using correction conditions corresponding to properties of the determined main object" as claimed in 11[c], and thus fails to show that Luo-250 and Hibi disclose or render obvious all elements of claim 11.

B. The Petition does not establish a reasonable likelihood that Luo-250, Hibi, and Terashita render obvious claims 2, 4, 6, 10, and 12 (Ground 2).

The Petition does not assert that Terashita discloses or renders obvious any of the independent claim elements absent from Luo-250, discussed above for Ground 1. Pet., 48-53; §VI.A.2.a.i-iii, *supra*. The Petition therefore does not establish a reasonable likelihood of success that the combination asserted in Ground 2 renders obvious any of the challenged claims. Ex. 2001, ¶¶88-89.

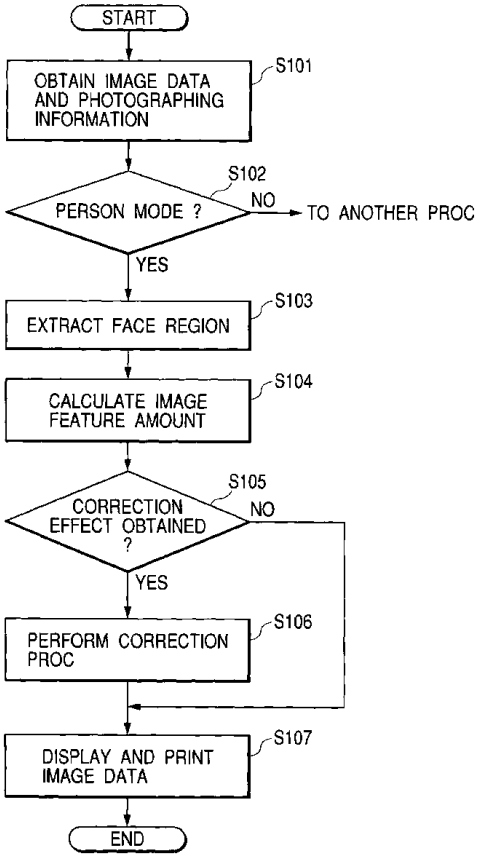
C. The Petition does not establish a reasonable likelihood that Yano and Terashita render obvious claims 1-12 (Ground 3).

1. Yano: Overview

Yano describes an image processing system to automatically correct the face region of a person in an image captured by a digital camera that was set, prior to capturing the image, to a "person" photographing mode to indicate that a person is the intended subject of the image. Ex. 1008, 2:35-57. Yano's image processing system is fundamentally different than the '574 inventions at least because Yano's system (1) detects and performs corrections to face regions only if the camera that captured the image data was set to "person" mode, rather than relying on post-capture image data; and (2) adjusts the face region using only one fixed target value for brightness and one fixed target value for color, rather than adjusting the main object using correction conditions that correspond to the properties of the main object to enable adjustments based on the unique characteristics, such as subtle variations in skin tone, of the determined main object. Ex. 2001, ¶¶90-94.

Yano's image processing system comprises six steps, S101-S106, as shown in Figure 4:

FIG. 4



Id., Fig. 4.

In step S101, an image obtaining processing means obtains image data and, unlike the '574 inventions, photographing information, which is recorded as incidental information to the image data. The photographing information includes whether the photographing mode was set to the "person" mode to indicate whether the image data includes a person. Ex. 1008, 4:25-31, 7:21-32.

In step S102, a photographing mode discrimination processing unit determines whether the image data was photographed and obtained in the "person"

mode by referring to the photographing information in. *Id.*, 7:33-47. Unlike the '574 invention, which relies on image data, Yano's image processing system only advances to its next step if the photographing information indicates the image data was obtained in "person" mode. *Id.*

In step S106, an image correction processing unit 17 performs the image correction. Unlike the '574 inventions, which use correction conditions that correspond to the properties of the determined main object to adjust the image quality of main objects that include a human face, Yano's image correction processing unit uses "a target value" corresponding to the "person" mode object determined in step S102 to correct the brightness and color (hue) of "the flesh color in the face region 33." Ex. 1008, 9:24-50 (describing "lightness correction"), 11:30-41 (describing "color correction"). Yano's target value for brightness and hue does not correspond to the brightness and hue properties of the image data that Yano's system identifies as face region 33 (e.g., the properties of the image data of the determined object); in fact, since the target value is determined "in advance" of any image processing based on "a range of [lightness or hue] of the flesh color that human beings feel desirable," the Yano's target value cannot correspond to the brightness and hue (color) properties of face region 33. *Id.*

In other words, compared to the '574 inventions, Yano's image correction process is an example of prior image processing systems that use standardized

adjustments (one target value for brightness and color) and are thus unable to take "advantage of the subtle characteristics of the main object," unlike the '574 inventions that enable adjustments that are "more responsive to variations in main objects." Ex. 1001, 1:38-48.

2. The Petition fails to show that Yano and Terashita render obvious claims 1-12.

a. Claim 1

i. The Petition fails to show that Yano discloses or suggests "acquiring correction conditions corresponding to the acquired properties [of the main object image]" (claim 1[c]).

Yano does not disclose "correction conditions corresponding to the acquired properties [of the determined main object]." Instead, Yano discloses an image correction process that uses "a target value" to correct the brightness and color (hue) of "the flesh color in the face region 33." Ex. 1008, 9:24-50 (describing "lightness correction"), 11:30-41 (describing "color correction"). Yano's target value for brightness and hue does not correspond to the brightness and hue properties of the image data that Yano's system identifies as face region 33; instead, each target value is determined "in advance" of any image processing based on "a range of [lightness or hue] of the flesh color that human beings feel desirable" and "stored in the image correction processing unit 17." *Id.*

The Petition asserts that Yano discloses or suggests this limitation because Yano's image correction processing unit 17 stores ranges of desirable lightness and hue values for human flesh colors, which are used to "obtain corrected lightness values and hue values of the pixels for the image data," which the Petition identifies as "correction conditions corresponding to the acquired properties." Pet., 59-60.

However, Yano's corrected values ("corrected lightness values and hue values") are not "correction conditions" but rather the corrected pixel values that are the output of Yano's image correction step S106 (for example, the result of the "adjusting the image quality" element of claim 1[d]). Yano's corrected pixel values are obtained by applying the target value (for example, the "correction condition" element of claim 1[c]) to each pixel of face region 33 according to formulas (1) and (2). Ex. 1008, 9:24-50, 11:30-41. But Yano's target value is not a "correction condition[] *corresponding* to [the properties of the determined main object]" because Yano's target value does not correspond to the brightness or hue (color) properties of face region 33. Instead, the target value is predetermined "in advance" of any image processing and Yano's system uses the target value to perform corrections to any face region 33 and does not correspond to the brightness or hue (color) properties of face region 33. *Id*. For example, Yano's brightness target value would be the same for a face region exhibiting light or dark

skin tone, and Yano's hue (color) target value would be the same for a face region exhibiting yellow or brown skin color. *Id.*; Ex. 2001, ¶98. The Petition does not address that Yano's target values do not correspond to properties of Yano's face region 33 and instead merely asserts a POSITA would understand those value are acquired "from memory." Pet., 59-60.

Because the Petition provides no evidence that Yano discloses or suggests "correction conditions *corresponding* to the acquired properties [of the determined main object]," the Petition has not established a reasonable likelihood that Yano discloses or suggests "acquiring correction conditions corresponding to the acquired properties [of the determined main object]." Ex. 2001, ¶¶97-99. The Petition does not contend that Yano renders this limitation obvious. Pet., 59-60.

ii. The Petition does not show that Yano discloses or renders obvious "adjusting image quality of the main object using the acquired correction conditions" (claim 1[d]).

Yano performs the inferior "standardized picture quality adjusting process" described in the Background of the '574 patent. Ex. 2001, ¶100; *see* §VI.A.1, *supra*; Ex. 1001, 1:38-46. Yano does not "adjust[] image quality of the main object using the acquired correction conditions [corresponding to the properties of the determined main object image data]," as claimed. The Petition therefore does not establish a reasonable likelihood that Yano discloses claim element 1[d], for the

reasons discussed above for claim element 1[c]. Ex. 2001, ¶100. The Petition does not contend that Yano renders the missing aspects of this limitation obvious. Pet., 60-62.

b. Claim 2

The Petition fails to show that Yano and Terashita render obvious the method of image processing as set forth in claim 1 and therefore fails to show that Yano and Terashita render obvious claim 2.

c. Claim 3

The Petition fails to show that Yano discloses or renders obvious "acquiring correction conditions corresponding to the acquired properties" as claimed in 1[c] and "adjusting image quality of the main object using the acquired correction conditions" as claimed in 1[d]. *See* §VI.C.2.a.i-ii, *supra*. Accordingly, the Petition fails to show that Yano discloses or renders obvious "adjusting image quality of the main object using correction conditions corresponding to properties of the determined main object" as claimed in 3[b]. Therefore, the Petition fails to show that Yano and Terashita disclose or render obvious all elements of claim 3.

d. Claim 4

The Petition fails to show that Yano and Terashita render obvious the method of image processing as set forth in claim 3 and therefore fails to show that Yano and Terashita render obvious claim 4.

e. Claim 5

The Petition fails to show that Yano discloses or renders obvious "acquiring correction conditions corresponding to the acquired properties" as claimed in 1[c] and "adjusting image quality of the main object using the acquired correction conditions" as claimed in 1[d]. *See* §VI.C.2.a.i-ii, *supra*. Accordingly, the Petition fails to show that Yano discloses or renders obvious acquiring "correction conditions corresponding to the acquired properties" as claimed in 5[e] and "an image quality adjuster configured to adjust image quality of the main object using the acquired correction conditions" as claimed in 5[f]. Therefore, the Petition fails to show that Yano and Terashita disclose or render obvious all elements of claim 5.

f. Claim 6

The Petition fails to show that Yano and Terashita render obvious the image processing apparatus as set forth in claim 5 and therefore fails to show that Yano and Terashita render obvious claim 6.

g. Claim 7

The Petition fails to show that Yano discloses or renders obvious "acquiring correction conditions corresponding to the acquired properties" as claimed in 1[c] and "adjusting image quality of the main object using the acquired correction conditions" as claimed in 1[d]. *See* §VI.C.2.a.i-ii, *supra*. Accordingly, the Petition fails to show that Yano discloses or renders obvious "an image quality adjuster

configured to adjust image quality of the main object using correction conditions corresponding to properties of the determined main object" as claimed in 7[d]. Therefore, the Petition fails to show that Yano and Terashita disclose or render obvious all elements of claim 7.

h. Claim 8

The Petition fails to show that Yano and Terashita render obvious the image processing apparatus as set forth in claim 7 and therefore fails to show that Yano and Terashita render obvious claim 8.

i. Claim 9

The Petition fails to show that Yano discloses or renders obvious "acquiring correction conditions corresponding to the acquired properties" as claimed in 1[c] and "adjusting image quality of the main object using the acquired correction conditions" as claimed in 1[d]. *See* §VI.C.2.a.i-ii, *supra*.. Accordingly, the Petition fails to show that Yano discloses or renders obvious acquiring "correction conditions corresponding to the acquired properties" as claimed in 9[d] and "computer readable code for adjusting image quality of the main object using the acquired correction conditions" as claimed in 9[e]. Therefore, the Petition fails to show that Yano and Terashita disclose or render obvious all elements of claim 9.

j. Claim 10

The Petition fails to show that Yano and Terashita render obvious the computer program product for image processing as set forth in claim 9 and therefore fails to show that Yano and Terashita render obvious claim 10.

k. Claim 11

The Petition fails to show that Yano discloses or renders obvious "acquiring correction conditions corresponding to the acquired properties" as claimed in 1[c] and "adjusting image quality of the main object using the acquired correction conditions" as claimed in 1[d]. *See* §VI.C.2.a.i-ii, *supra*.. Accordingly, the Petition fails to show that Yano discloses or renders obvious "computer readable code for adjusting image quality of the main object using correction conditions corresponding to properties of the determined main object" as claimed in 11[c]. Therefore, the Petition fails to show that Yano and Terashita disclose or render obvious all elements of claim 11.

l. Claim 12

The Petition fails to show that Yano and Terashita render obvious the computer program product for image processing as set forth in claim 11 and therefore fails to show that Yano and Terashita render obvious claim 12.

VII. CONCLUSION

The Petition does not establish a reasonable likelihood that any of the challenged claims are unpatentable. The Board should deny institution.

Date: October 11, 2024

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATION

I certify that this Patent Owner's Preliminary Response complies with the word count limit and contains 7,762 words in 14-point Times New Roman font as calculated by the word count feature of Microsoft Office, in compliance with 37 C.F.R. § 42.24(a)(1)(i). This word count is inclusive of all text and footnotes but does not include the table of contents, table of authorities, certificate of service or word count, or appendix of exhibits or claim listing.

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CERTIFICATE OF SERVICE

I certify that on October 11, 2024, a copy of Patent Owner's Preliminary Response, including exhibits, was served in its entirety by electronic mail to Petitioner's counsel at the following addresses indicated in Petitioner's Mandatory Notices:

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